

S/N 09/944981

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Kie Y. Ahn et al.

Examiner: Walter Lindsay

Serial No.: 09/944981

Group Art Unit: 2812

Filed: August 30, 2001

Docket: 1303.021US1

CRYSTALLINE OR AMOPHOUS MEDIUM-K GATE OXIDES, Y203 AND Gd2O3

INFORMATION DISCLOSURE STATEMENT

MS Amendment

Commissioner for Patents

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In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicants respectfully request that this Information Disclosure Statement be entered and the documents listed on the attached Form 1449 be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicants request that a copy of the 1449 form, initialed as being considered by the Examiner, be returned to the Applicants with the next official communication.

Pursuant to 37 C.F.R. §1.97(c)(2), Applicants have included the fee of \$180.00 as set forth in 37 C.F.R. §1.17(p). Please charge any additional fees or credit any overpayment to Deposit Account No. 19-0743.

The Examiner is invited to contact the Applicants' Representative at the below-listed telephone number if there are any questions regarding this communication.

Respectfully submitted,

KIE Y. AHN ET AL.

06/22/2004 GWORDF1 00000151 09944981

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By their Representatives,

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.

P.O. Box 2938

Minneapolis, MN 55402

(612) 373-6944

Date

6-18-04

By

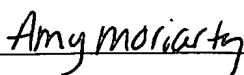


David C. Peterson

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: MS Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 18th day of June, 2004.

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Application Number	09/944981
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Examiner Name	Lindsay, Walter

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Attorney Docket No: 1303.021US1

US PATENT DOCUMENTS

Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document	Class	Subclass	Filing Date If Appropriate
	US-2001/0002280	05/31/2001	Sneh, Ofer	427	255.28	12/22/2000
	US-2001/0009695 A1	07/26/2001	Saanila, Ville A., et al.	427	255.39	01/18/2001
	US-2001/0042505	11/22/2001	Vaartstra, Brian A.	117	104	07/18/2001
	US-2001/0051442 A1	12/13/2001	Katsir, Dina , et al.	438	758	06/28/2001
	US-2001/0053082 A1	12/20/2001	Chipalkatti, Makarand H., et al.	362	496	12/22/1999
	US-2002/0192974	12/19/2002	Ahn, Kie Y., et al.	438	722	06/13/2001
	US-2002/0001971	01/03/2002	Cho, Hag-ju	438	765	06/27/2001
	US-2002/0022156 A1	02/21/2002	Bright, Clark I.	428	698	08/24/2001
	US-2002/0119297	08/29/2002	Forrest, Stephen R., et al.	428	199	12/21/2001
	US-2002/0146916 A1	10/10/2002	Irino, Kiyoshi , et al.	438	785	03/29/2002
	US-2003/0001212	01/02/2003	Hu, Yongjun , et al.	257	388	08/29/2002
	US-2003/0001241 A1	01/02/2003	Chakrabarti, Utpal K., et al.	257	643	05/28/2002
	US-2003/0003722	01/02/2003	Vaartstra, Brian A.	438	656	08/19/2002
	US-2003/0042526	03/06/2003	Weimer, Ronald A.	257	309	08/29/2001
	US-2003/0052356	03/20/2003	Yang, Haining , et al.	257	309	10/11/2002
	US-2003/0052358	03/20/2003	Weimer, Ronald A.	257	310	10/25/2002
	US-2003/0102501	06/05/2003	Yang, Haining , et al.	257	295	12/12/2002

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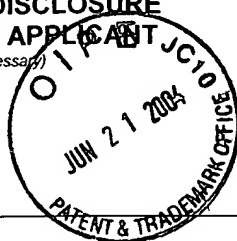
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US-2003/0119313	06/26/2003	Yang, Haining , et al.	438	681	12/05/2002
US-2003/0157764	08/21/2003	Ahn, Kie Y., et al.	438	212	02/20/2002
US-2003/0175411 A1	09/18/2003	Kodas, Toivo T., et al.	427	58	10/04/2002
US-200/30222300	12/04/2003	Basceri, Cem , et al.	257	309	03/13/2003
US-2003/0228747	12/11/2003	Ahn, Kie Y., et al.	438	591	06/05/2002
US-3,381,114	04/30/1968	Nakanuma, Sho	219	385	12/18/1964
US-4,394,673	07/19/1983	Thompson, Richard D., et al.	357	15	09/29/1980
US-4,413,022	11/01/1983	Suntola, Tuomo S., et al.	427	255.2	06/21/1979
US-4,590,042	05/20/1986	Drage, David J.	422	186.06	12/24/1984
US-4,767,641	08/30/1988	Kieser, Jorg , et al.	427	38	07/03/1986
US-4,993,358	02/19/1991	Mahawili, Imad	118	715	07/28/1989
US-5,006,192	04/09/1991	Deguchi, Mikio	156	345	11/21/1988
US-5,055,319	10/08/1991	Bunshah, Rointan F., et al.	427	38	04/02/1990
US-5,080,928	01/14/1992	Klinedinst, Keith A., et al.	427	70	10/05/1990
US-5,198,029	03/30/1993	Dutta, Arunava , et al.	118	303	02/19/1992
US-5,595,606	01/21/1997	Fujikawa, Yuichiro , et al.	118	725	04/18/1996
US-5,621,681	04/15/1997	Moon, Jong	365	145	03/22/1996
US-5,698,022	12/16/1997	Glassman, Timothy E., et al.			08/14/1996
US-5,735,960	04/07/1998	Sandhu, Gurtej S., et al.	118	723 IR	04/02/1996
US-5,744,374	04/28/1998	Moon, Jong	437	60	11/18/1996
US-5,789,030	08/04/1998	Rolfson, J B.	429	309	03/18/1996
US-5,840,897	11/24/1998	Kirlin, Peter , et al.	546	2	06/07/1995
US-5,916,365	06/29/1999	Sherman, Arthur	117	92	08/16/1996
US-5,950,925	09/14/1999	Fukunaga, Yukio , et al.	239	132.3	10/10/1997
US-5,972,847	10/26/1999	Feenstra, Roeland , et al.	505	473	01/28/1998
US-6,010,969	01/04/2000	Vaarstra, Brian A.	438	758	10/02/1996
US-6,025,627	02/15/2000	Forbes, Leonard , et al.	257	321	05/29/1998
US-6,057,271	05/02/2000	Kenjiro, Higaki , et al.	505	475	06/07/1995

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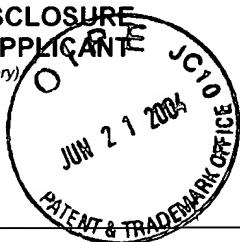
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US-6,059,885	05/09/2000	Ohashi, Tadashi , et al.	118	730	12/16/1997
US-6,093,944	07/25/2003	VanDover, Robert B.	257	310	06/04/1998
US-6,110,529	08/29/2000	Gardiner, R. A., et al.	427	250	06/07/1995
US-6,120,531	09/19/2000	Zhou, Lin , et al.	607	111	10/17/1997
US-6,161,500	12/19/2000	Kopacz, Stanislaw , et al.	118	723 E	09/30/1997
US-6,187,484	02/13/2001	Glass, Thomas R., et al.	430	5	08/31/1999
US-6,203,613	03/20/2001	Gates, Stephen M., et al.	117	104	10/19/1999
US-6,206,972	03/27/2001	Dunham, Scott W.	118	715	07/08/1999
US-6,207,589	03/27/2001	Ma, Yanjun , et al.	438	785	02/29/2000
US-6,217,645	04/17/2001	Vaartstra, Brian A.	106	287.18	09/02/1999
US-6,225,237	05/01/2001	Vaartstra, Brian A.	438	778	09/01/1998
US-6,232,847	05/15/2001	Marcy, 5th, Henry O., et al.	331	167	05/28/1998
US-6,273,951	08/14/2001	Vaartstra, Brian A.	117	104	06/16/1999
US-6,281,144	08/28/2001	Cleary, Thomas J., et al.	438	780	07/15/1999
US-6,291,866	09/18/2001	Wallace, Robert M., et al.	257	410	10/20/1999
US-6,294,813	09/25/2001	Forbes, Leonard , et al.	257	321	02/15/2000
US-6,297,516	10/02/2001	Forrest, Stephen R., et al.	257	40	06/25/1999
US-6,302,964	10/16/2001	Umotoy, Salvador P., et al.	118	715	03/16/2000
US-6,331,465	12/18/2001	Forbes, Leonard , et al.	438	260	02/15/2000
US-6,348,386	02/19/2002	Gilmer, David C.	438	288	04/16/2001
US-6,368,398	04/09/2002	Vaartstra, Brian A.	106	28718	01/19/2001
US-6,368,518	04/09/2002	Vaartstra, Brian A.	216	67	08/25/1999
US-6,380,579	04/30/2002	Nam, Sang-don , et al.	257	306	04/11/2000
US-6,391,769	05/21/2002	Lee, Jong-myeong , et al.	438	643	03/14/2000
US-6,420,279	07/16/2002	Ono, Yoshi , et al.	438	785	06/28/2001
US-6,432,779	08/13/2002	Hobbs, Christopher , et al.	438	287	01/30/2001
US-6,444,039	09/03/2002	Nguyen, Tue	118	715	03/07/2000
US-6,444,895	09/03/2002	Nikawa, Kiyoshi	136	212	09/24/1999
US-6,445,023	09/03/2002	Vaartstra, Brian , et al.	257	295	03/16/1999

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	US-6,448,192	09/10/2002	Kaushik, Vidya S.	438	785	04/16/2001
	US-6,451,695	09/17/2002	Sneh, Ofer	438	685	12/22/2000
	US-6,455,717	09/24/2002	Vaartstra, Brian A.	556	1	08/28/2000
	US-6,458,701	10/01/2002	Chae, Yun-sook , et al.	438	680	10/12/2000
	US-6,465,334	10/15/2002	Buynoski, Matthew S., et al.	438	591	10/05/2000
	US-6,482,740	11/19/2002	Soininen, Pekka J., et al.	438	686	05/15/2001
	US-6,498,063	12/24/2002	Ping, Er-Xuan	438	253	10/12/2001
	US-6,514,828	02/04/2003	Ahn, Kie Y., et al.	438	297	04/20/2001
	US-6,518,610	02/11/2003	Yang, Haining , et al.	257	295	02/20/2001
	US-6,521,911	02/18/2003	Parsons, Gregory N., et al.	257	52	07/19/2001
	US-6,524,867	02/25/2003	Yang, Haining , et al.	438	3	12/28/2000
	US-6,524,901	02/25/2003	Trivedi, Jigish D.	438	183	06/20/2002
	US-6,534,420	03/18/2003	Ahn, Kie Y., et al.	438	768	07/18/2001
	US-6,573,199	06/03/2003	Sandhu, Gurtej S., et al.	438	798	08/30/2001
	US-6,586,792	07/01/2003	Ahn, Kie Y., et al.	257	295	03/15/2001
	US-6,593,610	07/15/2003	Gonzalez, Fernando	257	296	12/13/2001
	US-6,602,338	08/05/2003	Chen, San-Yuan , et al.	106	287.19	04/11/2001
	US-6,608,378	08/19/2003	Ahn, Kie Y., et al.	257	701	08/26/2002
	US-6,613,702	09/02/2003	Sandhu, Gurtej S., et al.	438	798	01/17/2003
	US-6,639,267	10/28/2003	Eldridge, Jerome M.	257	310	07/29/2002
	US-6,661,058	12/09/2003	Ahn, Kie Y., et al.	257	344	02/11/2002
	US-6,682,602	01/27/2004	Vaartstra, Brian A.	118	715	08/19/2002
	US-6,683,005	01/27/2004	Sandhu, Gurtej S., et al.	438	715	01/17/2003

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Foreign Document No	Publication Date	Name of Patentee or Applicant of cited Document	Class	Subclass	T ²
	JP-5090169	04/09/1993	Watanabe, Kunihiro , et al.			
	JP-62-199019	09/02/1987	Takaaki, Sasaki			

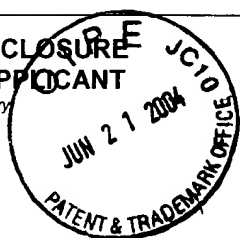
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OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
		AARIK, JAAN, et al., "Atomic layer growth of epitaxial TiO/sub 2/ thin films from TiCl/sub 4/ and H/sub 2/O on alpha -Al/sub 2/O/sub 3/ substrates", <u>Journal of Crystal Growth</u> , 242(1-2), (2002), 189-198	
		AARIK, JAAN, et al., "Influence of substrate temperature on atomic layer growth and properties of HfO/sub 2/ thin films", <u>Thin Solid Films</u> , 340(1-2), (1999), 110-116	
		AARIK, JAAN, et al., "Phase transformations in hafnium dioxide thin films grown by atomic layer deposition at high temperatures", <u>Applied Surface Science</u> , 173(1-2), (March 2001), 15-21	
		AARIK, JAAN, et al., "Texture Development in nanocrystalline hafnium dioxide thin films grown by atomic layer deposition", <u>Journal of Crystal Growth</u> , 220, (2000), 105-113	
		AHN, K. Y., et al., "Electron Beam Deposition of Amorphous Lanthanide-doped TiOx Dielectric Films", 3 pages	
		ALEN, PETRA, "Atomic Layer deposition of Ta(Al)N(C) thin films using trimethylaluminum as a reducing agent", <u>Journal of the Electrochemical Society</u> , 148(10), (October 2001), G566-G571	
		BENDORAITIS, J G., et al., "Optical energy gaps in the monoclinic oxides of hafnium and zirconium and their solid solutions", <u>Journal of Physical Chemistry</u> , 69(10), (1965), 3666-3667	
		BRAUD, F., "Ultra Thin Diffusion Barriers for Cu Interconnections at The Gigabit Generation and Beyond", <u>VMIC Conference Proceedings</u> , (1996), 174-179	
		BUNSHAH, ROINTAN F., et al., "Deposition Technologies for Films and Coatings: Developments and Applications", Park Ridge, N.J., U.S.A. : Noyes Publications, (1982), 102-103	
		CAVA, R J., et al., "Improvement of the dielectric properties of Ta/sub 2/O/sub 5/ through substitution with Al/sub 2/O/sub 3/", <u>Applied Physics Letters</u> , 70(11), (March 1997), 1396-8	
		CHAMBERS, J J., et al., "Physical and electrical characterization of ultrathin yttrium silicate insulators on silicon", <u>Journal of Applied Physics</u> , 90(2), (July 15, 2001), 918-33	
		COPEL, M., et al., "Structure and stability of ultrathin zirconium oxide layers on Si(001)", <u>Applied Physics Letters</u> , 76(4), (January 2000), 436-438	
		DE FLAVIIS, FRANCO, et al., "Planar microwave integrated phase-shifter design with high purity ferroelectric material", <u>IEEE Transactions on Microwave Theory & Techniques</u> , 45(6), (June 1997), 963-969	
		DESU, S B., "Minimization of Fatigue in Ferroelectric Films", <u>Physica Status Solidi A</u> , 151(2), (1995), 467-480	

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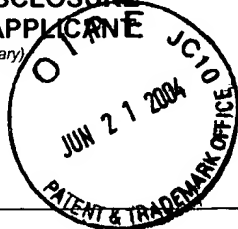
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Attorney Docket No: 1303.021US1

	DING, "Copper Barrier, Seed Layer and Planerization Technologies", <u>VMIC Conference Proceedings</u> , (1997),87-92	
	DUSCO, C , et al., "Deposition of tin oxide into porous silicon by atomic layer epitaxy", <u>Journal of the Electrochemical Society</u> , 143, (1996),683-687	
	EL-KAREH, B , et al., "The evolution of DRAM cell technology", <u>Solid State Technology</u> , 40(5), (1997),89-90, 92, 95-6, 98, 100-1	
	ENGELHARDT, M. , "Modern Applications of Plasma Etching and Patterning in Silicon Process Technology", <u>Contributions to Plasma Physics</u> , 39(5), (1999),473-478	
	FUKUMOTO, HIROFUMI , et al., "Heteroepitaxial growth of Y2O3 films on silicon", <u>Applied Physics Letters</u> , 55(4), (July 24, 1989),360-361	
	FUYUKI, TAKASHI , et al., "Electronic Properties of the Interface between Si and TiO2 Deposited at Very Low Temperatures", <u>Japanese Journal of Applied Physics</u> , Vol. 25, No. 9, (1986),1288-1291	
	GARTNER, M , et al., "Spectroellipsometric characterization of lanthanide-doped TiO2 films obtained via the sol-gel technique", <u>Thin Solid Films</u> , 234(1-2), (1993),561-565	
	GELLER, S. , et al., "Crystallographic Studies of Perovskite-like Compounds. II. Rare Earth Aluminates", <u>Acta Cryst.</u> Vol. 9, (May 1956),1019-1025	
	GIESS, E. A., et al., "Lanthanide gallate perovskite-type substrates for epitaxial, high-T/sub c/ superconducting Ba/sub 2/YCu/sub 3/O/sub 7- delta / films", <u>IBM Journal of Research and Development</u> , 34(6), (November 1990),916-926	
	GUILLAUMOT, B , et al., "75 nm damascene metal gate and high-k integration for advanced CMOS devices", <u>Technical Digest of International Electron Devices Meeting 2002</u> , (2002),355-358	
	GUO, et al., "High Quality Ultra-thin (1.5nm) TiO2/Si3N4 Gate Dielectric for Deep Sub-micron CMOS Technology", <u>Cited in related application</u> , (1999),	
	GUSEV, E P., et al., "Ultrathin High-K Dielectrics Grown by Atomic Layer Deposition: A Comparative Study of ZrO2, HfO2, Y2O3 and Al2O3", <u>Electrochemical Society Proceedings Volume 2001-9</u> , (2001),189-195	
	GUTOWSKI, M J., "Thermodynamic stability of high-K dielectric metal oxides ZrO/sub 2/ and HfO/sub 2/ in contact with Si and SiO/sub 2/", <u>Applied Physics Letters</u> , 80(11), (March 18, 2002),1897-1899	
	HUNT, C. E., et al., "Direct bonding of micromachined silicon wafers for laser diode heat exchanger applications", <u>Journal of Micromechanics and Microengineering</u> , 1(3), (September 1991),152-156	
	IDDLES, D M., et al., "Relationships between dopants, microstructure and the microwave dielectric properties of ZrO2-TiO2-SnO2 ceramics", <u>Journal of Materials Science</u> , 27(23), (December 1992),6303-6310	
	IJIMA, T. , "Microstructure and Electrical Properties of Amorphous W-Si-N Barrier Layer for Cu Interconnections", <u>1996 VMIC Conference</u> , (1996),168-173	
	JEON, SANGHUN , et al., "Excellent electrical characteristics of lanthanide (Pr, Nd, Sm, Gd, and Dy) oxide and lanthanide-doped oxide for MOS gate dielectric	

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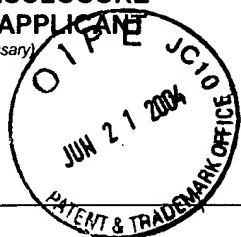
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Attorney Docket No: 1303.021US1

		applications", <u>Electron Devices Meeting, 2001. IEDM Technical Digest. International, (2001),471-474</u>	
		JEONG, CHANG-WOOK, et al., "Plasma-Assisted Atomic layer Growth of High-Quality Aluminum Oxide Thin Films", <u>Japanese Journal of Applied Physics, 40, (January 2001),285-289</u>	
		JUNG, H S., et al., "Improved current performance of CMOSFETs with nitrogen incorporated HfO/sub 2/-Al/sub 2/O/sub 3/ laminate gate dielectric", <u>Technical Digest of International Electron Devices Meeting 2002, (2002),853-856</u>	
		KANG, L, et al., "MOSFET devices with polysilicon on single-layer HfO/sub 2/ high-K dielectrics", <u>International Electron Devices Meeting 2000. Technical Digest. IEDM, (2000),35-8</u>	
		KEOMANY, D., et al., "Sol gel preparation of mixed cerium-titanium oxide thin films", <u>Solar Energy Materials and Solar Cells, 33(4), (August 1994),429-441</u>	
		KIM, Y W., et al., "50nm gate length logic technology with 9-layer Cu interconnects for 90nm node SoC applications", <u>Technical Digest of International Electron Devices Meeting 2002, (2002),69-72</u>	
		KIM, C. T., et al., "Application of Al ₂ O ₃ Grown by Atomic Layer Deposition to DRAM and FeRAM", <u>12th International Symposium in Integrated Ferroelectrics, (March, 2000),1 page</u>	
		KIM, D., et al., "Atomic Control of Substrate Termination and Heteroepitaxial Growth of SrTiO ₃ /LaAlO ₃ Films", <u>Journal of the Korean Physical Society, 36(6), (June 2000),444-448</u>	
		KIM, BYOUNG-YOUP, et al., "Comparison study for TiN films deposited from different method: chemical vapor deposition and atomic layer deposition", <u>Mechanisms of Surface and Microstructure Evolution in Deposited Films and Film Structures Symposium (Materials Research Society Symposium Proceedings Vol.672), (2001),7.8.1-7.8.6</u>	
		KIM, TAESEOK, et al., "Correlation between strain and dielectric properties in ZrTiO/sub 4/ thin films", <u>Applied Physics Letters, 76(21), (May 2000),3043-3045</u>	
		KIM, TAESEOK, et al., "Dielectric properties and strain analysis in paraelectric ZrTiO/sub 4/ thin films deposited by DC magnetron sputtering", <u>Japanese Journal of Applied Physics Part 1-Regular Papers Short Notes & Review Papers, vol.39, no.7A, (2000),4153-4157</u>	
		KIM, YONGJO, et al., "Effect of microstructures on the microwave dielectric properties of ZrTiO/sub 4/ thin films", <u>Applied Physics Letters, 78(16), (April 2001),2363-2365</u>	
		KIM, Y, et al., "Substrate dependence on the optical properties of Al/sub 2/O/sub 3/ films grown by atomic layer deposition", <u>Applied Physics Letters, 71(25, 22), (December 1997),3604-3606</u>	

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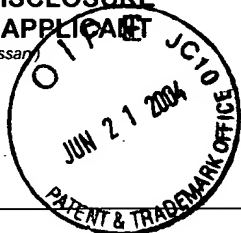
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Attorney Docket No: 1303.021US1

	KRAUTER, G. , et al., "Room Temperature Silicon Wafer Bonding with Ultra-Thin Polymer Films", <u>Advanced Materials</u> , 9(5), (1997),417-420	
	KUKLI, KAUPÖ , "Atomic Layer Deposition of Titanium Oxide from TiI4 and H2O2", <u>Chemical Vapor Deposition</u> , 6(6), (2000),303-310	
	KUKLI, K , et al., "Comparison of hafnium oxide films grown by atomic layer deposition from iodide and chloride precursors", <u>Thin Solid Films</u> , 416, (2002),72-79	
	KUKLI, K , et al., "Controlled growth of yttrium oxysulphide thin films by atomic layer deposition", <u>Materials Science Forum</u> , 315-317, (1999),216-221	
	KUKLI, KAUPÖ , et al., "Dielectric Properties of Zirconium Oxide Grown by Atomic Layer Deposition from Iodide Precursor", <u>Journal of The Electrochemical Society</u> , 148(12),(2001),F227-F232	
	KUKLI, KAUPÖ , et al., "Influence of thickness and growth temperature on the properties of zirconium oxide films growth by atomic layer deposition on silicon", <u>Thin Solid Films</u> , 410(1-2), (2002),53-60	
	KUKLI, KAUPÖ , et al., "Low-Temperature Deposition of Zirconium Oxide-Based Nanocrystalline Films by Alternate Supply of Zr[OC(CH3)3]4 and H2O", <u>Chemical Vapor Deposition</u> , 6(6), (2000),297-302	
	KUKLI, K J., et al., "Properties of hafnium oxide films grown by atomic layer deposition from hafnium tetraiodide and oxygen", <u>Journal of Applied Physics</u> , 92(10), (November 15, 2002),5698-5703	
	KWO, J. , et al., "High gate dielectrics Gd2O3 and Y2O3 for silicon", <u>Applied Physics Letters</u> , 77(1), (July 3, 2000),130-132	
	KWO, J. , "Properties of high k gate dielectrics Gd2O3 and Y2O3 for Si", <u>Journal of Applied Physics</u> , 89(7), (2001),3920-3927	
	LAURSEN, T. , "Encapsulation of Copper by Nitridation of Cu-Ti Alloy/Bilayer Structures", <u>International Conference on Metallurgical Coatings and Thin Films</u> , Abstract No. H1.03, San Diego, CA,(April 1997),309	
	LEE, BYOUNG H., et al., "Characteristics of TaN gate MOSFET with ultrathin hafnium oxide (8 Å-12 Å)", <u>Electron Devices Meeting, 2000. IEDM Technical Digest. International</u> , (2000),39-42	
	LEE, A E., et al., "Epitaxially grown sputtered LaAlO3 films", <u>Applied Physics Letters</u> , 57(19), (November 1990),2019-2021	
	LEE, S J., et al., "High quality ultra thin CVD HfO2 gate stack with poly-Si gate electrode", <u>Electron Devices Meeting, 2000. IEDM Technical Digest. International</u> , (2000),31-34	
	LEE, CHENG-CHUNG , et al., "Ion-assisted deposition of silver films", <u>Thin Solid Films</u> , vol. 359, (2000),95-97	
	LEE, JUNG-HYOUNG , et al., "Mass production worthy HfO/sub 2/-Al/sub 2/O/sub 3/ laminate capacitor technology using Hf liquid precursor for sub-100 nm DRAMs", <u>Electron Devices Meeting, 2002. IEDM '02. Digest. International</u> , (2002),221-224	

EXAMINER

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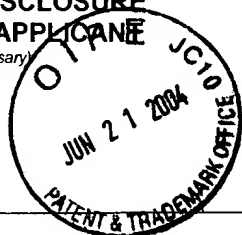
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	LEE, DONG H., et al., "Metalorganic chemical vapor deposition of TiO ₂ :N anatase thin film on Si substrate", <u>Appl. Phys. Lett.</u> , 66(7), (February 1995),815-816	
	LEE, L P., et al., "Monolithic 77 K dc SQUID magnetometer", <u>Applied Physics Letters</u> , 59(23), (December 1991),3051-3053	
	LEE, C. H., et al., "MOS Characteristics of Ultra Thin Rapid Thermal CVD ZrO ₂ and Zr Silicate Gate Dielectrics", <u>Electron Devices Meeting, 2000. IEDM Technical Digest. International</u> , (2000),27-30	
	LEE, C H., et al., "MOS Devices with High Quality Ultra Thin CVD ZrO ₂ Gate Dielectrics and Self-Aligned TaN and TaN/Poly-Si Gate electrodes", <u>2001 Symposium on VLSI Technology Digest of Technical Papers</u> , (2001),137-138	
	LEE, et al., "Ultrathin Hafnium Oxide with Low Leakage and excellent Reliability fo rAlternative Gae Dielecric Application", <u>IEEE Technical Digest of International Electron Devices Meeting 1999</u> , (1999),133-136	
	LESKELA, M. , et al., "ALD precursor chemistry: Evolution and future challenges", <u>J. Phys. IV France</u> , 9, (1999),837-852	
	LUAN, et al., "High Quality Ta ₂ O ₅ Gate Dielectrics and T[...]", <u>IEEE Technical Digest of Int. Elec. Devices Mtng 1999</u> , (1999),141-142	
	LUCOVSKY, G , et al., "Microscopic model for enhanced dielectric constants in low concentration SiO ₂ /sub 2/-rich noncrystalline Zr and Hf silicate alloys", <u>Applied Physics Letters</u> , 77(18), (October 2000),2912-2914	
	LUO, Z J., et al., "Ultra-thin ZrO ₂ (or Silicate) with High Thermal Stability for CMOS Gate Applications", <u>2001 Symposium on VLSI Technology Digest of Technical Papers</u> , (2001),135-136	
	MARTIN, et al., "Ion-beam-assisted deposition of thin films", <u>Applied Optics</u> , 22(1), (1983),178-184	
	MOLODYK, A A., et al., "Volatile Surfactant-Assisted MOCVD: Application to LaAlO ₃ Thin Film Growth", <u>Chemical Vapor Deposition</u> , 6(3), (June 2000),133-138	
	MOLSA, HEINI , et al., "Growth of yttrium oxide thin films from beta -diketonate precursor", <u>Advanced Materials for Optics and Electronics</u> , 4(6), (November-December 1994),389-400	
	NAKAGAWARA, OSAMU , et al., "Electrical properties of (Zr, Sn)TiO ₄ dielectric thin film prepared by pulsed laser deposition", <u>Journal of Applied Physics</u> , 80(1), (July 1996),388-392	
	NAKAJIMA, ANRI , et al., "Atomic-layer deposition of ZrO ₂ /sub 2/ with a Si nitride barrier layer", <u>Applied Physics Letters</u> , vol.81, no.15, (October 2002),2824-2826	
	NAKAJIMA, ANRI , et al., "NH/ ₃ -annealed atomic-layer-deposited silicon nitride as a high-k gate dielectric with high reliability", <u>Applied Physics Letters</u> , 80(7), (February 2002),1252-1254	
	NAKAJIMA, ANRI , "Soft breakdown free atomic-layer-deposited silicon-nitride/SiO ₂ /sub 2/ stack gate dielectrics", <u>International Electron Devices Meeting. Technical Digest</u> , (2001),6.5.1-4	

EXAMINER

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		NEUMAYER, D A., et al., "Materials characterization of ZrO/sub 2/-SiO/sub 2/ and HfO/sub 2/-SiO/sub 2/ binary oxides deposited by chemical solution deposition", <u>Journal of Applied Physics</u> , 90(4), (August 15, 2001),1801-1808	
		NIILISK, A , "Atomic-scale optical monitoring of the initial growth of TiO2 thin films", <u>Proceedings of the SPIE - The International Society for Optical Engineering</u> , 4318, (2001),72-77	
		OATES, D E., et al., "Surface impedance measurements of YBa/sub 2/Cu/sub 3/O/sub 7-x/ thin films in stripline resonators", <u>IEEE Transactions on Magnetics</u> , vol.27, no.2, pt.2, (March 1991),867-871	
		OH, C B., et al., "Manufacturable embedded CMOS 6T-SRAM technology with high-k gate dielectric device for system-on-chip applications", <u>Technical Digest of International Electron Devices Meeting 2002</u> , (2002),423-426	
		OSTEN, H J., et al., "High-k Gate Dielectrics with Ultra-low Leakage Current Based on Praseodymium Oxide", <u>Technical Digest of IEDM</u> , (2000),653-656	
		PARK, JAEHOO , et al., "Chemical vapor deposition of HfO/sub 2/ thin films using a novel carbon-free precursor: characterization of the interface with the silicon substrate", <u>Journal of the Electrochemical Society</u> , 149(1), (2002),G89-G94	
		PARK, BYUNG-EUN , et al., "Electrical properties of LaAlO3/Si and Sr0.8Bi2.2Ta2O9/LaAlO3/Si structures", <u>Applied Physics Letters</u> , 79(6), (August 2001),806-808	
		PERKINS, CHARLES M., et al., "Electrical and materials properties of ZrO2 gate dielectrics grown by atomic layer chemical vapor deposition", <u>Applied Physics Letters</u> , 78(16), (April 2001),2357-2359	
		POVESHCHENKO, V P., et al., "Investigation of the phas composition of films of zirconium, hafnium and yttrium oxides", <u>Soviet Journal of Optical Technology</u> , 51(5), (1984),277-279	
		QI, W , "MOSCAP and MOSFET characteristics using ZrO2 gate dielectric deposited directly on Si", <u>IEDM - Technical Digest</u> , (1999),145-148	
		QI, WEN-JIE , et al., "Performance of MOSFETs with ultra thin ZrO/sub 2/ and Zr silicate gate dielectrics", <u>2000 Symposium on VLSI Technology. Digest of Technical Papers</u> , (2000),40-41	
		RAHTU, ANTTI , et al., "Atomic Layer Deposition of Zirconium Titanium Oxide from Titanium Isopropoxide and Zirconium Chloride", <u>Chemistry of Materials</u> , 13(5), (May 2001),1528-1532	
		RAMAKRISHNAN, E S., et al., "Dielectric properties of radio frequency magnetron sputter deposited zirconium titanate-based thin films", <u>Journal of the Electrochemical Society</u> , 145(1), (January 1998),358-362	
		RAYNER JR., G , et al., "The structure of plasma-deposited and annealed pseudo-binary ZrO2-SiO2 alloys", <u>Materials Research Society Symposium - Proceedings</u> , 611, (2000),C131-C139	
		RITALA, MIKKO , "Atomic Layer Epitaxy Growth of Titanium, Zirconium and Hafnium Dioxide Thin Films", <u>Annales Academiae Scientiarum Fennicae</u> , (1994),24-25	

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		RITALA, MIKKO , et al., "Zirconium dioxide thin films deposited by ALE using zirconium tetrachloride as precursor", <u>Applied Surface Science</u> , 75, (January 1994),333-340	
		ROBERTSON, J. , "Band offsets of wide-band-gap oxides and implications for future electronic devices", <u>Journal of Vacuum Science & Technology B (Microelectronics and Nanometer Structures)</u> , 18(3), (May-June 2000),1785-1791	
		ROSSNAGEL, S M., et al., "Plasma-enhanced atomic layer deposition of Ta and Ti for Interconnect diffusion barriers", <u>Journal of Vacuum Science & Technology B (Microelectronics and Nanometer Structures)</u> , 18(4), (July 2000),2016-2020	
		ROTONDARO, A L., et al., "Advanced CMOS Transistors with a Novel HfSiON Gate Dielectric", <u>Symposium on VLSI Technology Digest of Technical Papers</u> , (2002),148-149	
		RYU, CHANGSUP , "Barriers for Copper Interconnections", <u>Solid State Technology</u> , 42(4), (April 1999),53-56	
		SAITO, Y , "High-Integrity Silicon Oxide Grown at Low-temperature by Atomic Oxygen Generated in High-Density Krypton Plasma", <u>Extended Abstracts of the 1999 International Conference on Solid State Devices and Materials</u> , (1999),152-153	
		SHANWARE, A , et al., "Reliability evaluation of HfSiON gate dielectric film with 12.8 A SiO2 equivalent thickness", <u>International Electron Devices Meeting. Technical Digest</u> , (2001),137-140	
		SHIN, CHANG H., et al., "Fabriation and Characterization of MFISFET Using Al2O3 Insulating Layer for Non-volatile Memory", <u>12th International Symposium in Integrated Ferroelectrics</u> , (March 2000),9 pages	
		SNEH, OFER , et al., "Thin film atomic layer deposition equipment for semiconductor processing", <u>Thin Solid Films</u> , 402(1-2), (Jan. 1, 2002),248-261	
		SONG, HYUN-JUNG , et al., "Atomic Layer Deposition of Ta2O5 Films Using Ta(OC2H5)5 and NH3", <u>Ultrathin SiO/sub 2/ and High-K Materials for ULSI Gate Dielectrics. Symposium</u> , (1999),469-471	
		SOUCHE, et al., "Visible and infrared ellipsometry study of ion assisted SiO2 films", (1998),676-681	
		SUNTOLA, T. , "Atomic Layer Epitaxy", <u>Handbook of Crystal Growth</u> , 3; <u>Thin Films of Epitaxy, Part B: Growth Mechanics and Dynamics</u> , Amsterdam,(1994),602-663	
		TAKEMOTO, J. H., et al., "Microstrip Resonators and Filters Using High-TC Superconducting Thin Films on LaAlO3", <u>IEEE Transaction on Magnetics</u> , 27(2), (March 1991),2549-2552	
		TARRE, A , et al., "Comparative study of low-temperature chloride atomic-layer chemical vapor deposition of TiO2 and SnO2", <u>Applied Surface Science</u> , 175-176, (May 2001),111-116	

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		TAVEL, B , et al., "High performance 40 nm nMOSFETs with HfO ₂ /gate dielectric and polysilicon damascene gate", <u>Technical Digest of International Electron Devices Meetings 2002</u> , (2002),429-432	
		VAN DOVER, R. B., et al., "Amorphous lanthanide-doped TiO _x dielectric films", <u>Applied Physics Letters</u> , 74(20), (May 17, 1999),3041-3043	
		VAN DOVER, R B., et al., "Deposition of Uniform Zr-Sn-Ti-O Films by On-Axis Reactive Sputtering", <u>IEEE Electron Device Letters</u> , 19(9), (September 1998),329 - 331	
		VAN DOVER, R. B., et al., "Discovery of a useful thin-film dielectric using a composition-spread approach", <u>Nature</u> , 392(6672), (March 12, 1998),162-4	
		VIIROLA, H , "Controlled growth of antimony-doped tin dioxide thin films by atomic layer epitaxy", <u>Thin Solid Films</u> , 251, (November 1994),127-135	
		VISOKAY, M R., "Application of HfSiON as a gate dielectric material", <u>Applied Physics Letters</u> , 80(17), (April 2002),3183-3185	
		WILK, G D., et al., "Hafnium and zirconium silicates for advanced gate dielectrics", <u>Journal of Applied Physics</u> , 87(1), (January 2000),484-492	
		WILK, G. D., et al., "High-K gate dielectrics: Current status and materials properties considerations", <u>Journal of Applied Physics</u> , 89(10), (May 2001),5243-5275	
		WOLF, STANLEY , et al., "Future Trends in Sputter Deposition Processes", <u>In: Silicon Processing of the VLSI Era, Vol. 1</u> , Lattice Press,(1986),374-380	
		WOLFRAM, G , et al., "Existence range, structural and dielectric properties of Zr _x Ti _y Sn _z O ₄ ceramics (x + y =2)", <u>Materials Research Bulletin</u> , 16(11), (November 1981),1455-63	
		YAMAGUCHI, TAKESHI , "Band Diagram and Carrier Conduction Mechanism in ZrO ₂ /Zr-silicate/Si MIS Structure Fabricated by Pulsed-laser-ablation Deposition", <u>Electron Devices Meeting, 2000. IEDM Technical Digest. International</u> , (2000),19-22	
		YAMAGUCHI, TAKESHI , et al., "Study on Zr-Silicate Interfacial Layer of ZrO ₂ -MIS Structure FABricated by Pulsed Laser Ablation Deposition Method", <u>Solid State Devices and Materials</u> , (2000),228-229	
		ZHANG, H. , "Atomic Layer Deposition of High Dielectric Constant Nanolaminates", <u>Journal of The Electrochemical Society</u> , 148(4), (April 2001),F63-F66	
		ZHANG, H , et al., "High permittivity thin film nanolaminates", <u>Journal of Applied Physics</u> , 87(4), (February 2000),1921-1924	
		ZHU, W , et al., "HfO ₂ and HfAlO for CMOS: Thermal Stability and Current Transport", <u>IEEE International Electron Device Meeting 2001</u> , (2001),463-466	
		ZUCKER, O , et al., "Application of Oxygen Plasma Processing to Silicon Direct Bonding", <u>Sensors and Actuators A</u> , 36, (1993),227-231	

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